

The Design of Information Technology Pattern for Traceability to Increase Export Efficiency of Golden Banana

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ABSTRACT

The traceability is one of the reasons that increase the consumer's confidence of buying the product as the consumer is able to track the route of the product and also able to reduce the loss of the company in the cost of returning product by the company itself. The traceability has 2 main components which are tracking and tracing. As now there are so many technologies which can apply to the traceability process and increase the efficiency of the traceability which will elevate the export efficiency of the exporting of golden banana. So, the author decided to proceed and research on the design of information technology pattern for traceability to increase export efficiency of golden banana as the Thailand's golden banana has a very high export potential especially for exporting to Japan. The author was studied the literature review and related theory and did the in-depth interview to identify the most suitable process and technology then design the information technology pattern for traceability to increase export efficiency of golden banana. The evaluation of the pattern was in a "Good" and "Appropriate."

Keywords: Information Technology, Traceability Export, Golden Banana

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Introduction

The traceability is one of the reasons that increase the consumer's confidence of buying the product as the consumer is able to track the route of the product and also able to reduce the loss of the company in the cost of returning product by the company itself. The traceability has 2 main components which are tracking and tracing. (Chen, 2013; Exposito, Gay-Fernandez, and Cuinas, 2013)

Tracking is the process which is able to track the whereabouts of the specific goods or package. The benefit of this process can be illustrated as if one of the raw materials of the final goods, which had been distributed to the consumers, was defected. The seller has to recall the product which manufactured from the defected raw material which this process will help to reduce the cost of recall and also increase the efficiency of the recall by the accurate information of the products' whereabouts. Another process is the traceability process. This process can trace the defect of the final goods to the root of the problem which always is the supplier and also help to identify the size of defect and process. This information will be transferred to the seller and distributor and the problem should be solved in time. (Karlsen, Dreyer, Olsen, and Elvevoll, 2013)

As now there are so many technologies which can apply to the traceability process and increase the efficiency of the traceability which will elevate the export efficiency of the exporting of golden banana. (Qian, Yang, Wu, Zhao, Fan, and Xing, 2012; Wang, Yang, and Gu, 2012; Tarjan, Šenk, Tegeltija, Stankovski, and Ostojic, 2014). So the author decided to proceed and research on "the design of information technology pattern for traceability to increase export efficiency of golden banana" as the Thailand's golden banana has a very high export potential especially for exporting to Japan but the problem was started from the huge flooding in 2011 which caused the major decrease in the golden banana supply.

Literature Review

In this research, the authors did a secondary data research about the design and development of the traceability information technology prototype of the agriculture product. There was a research about the traceability systems which are an inseparable part of international business and are essential in manufacturing and supply chain management systems. The advantages of the traceability system are more obvious for products that are exported and those imported from overseas. Traceability is highly important in food management and for products with short expiry.

In recent years there have been several investigations and publications on traceability systems criteria especially in the food industry in the US, Europe and Southeast Asia (Lavelli, 2013; Liao, Chang and Chang, 2011; Olsen and Borit, 2013; Yan, Shi and Huang, 2012). And also, there was a research indicated that the traceability of data through transformation stages of each individual food product, starting from raw products and to the final product, as well as printing the key data

on the product package, adds to the consumers' trust in product quality. For each food product, it is necessary to track data starting from the stage of raw products farming, through food processing, transport, warehousing, to retailing and reaching the end consumer. In order to allow insight to the key data to the user (mostly end consumer), this paper suggests recording the data on the product package in the form of a quick response two-dimensional barcode (QR code) in key points of the product's life cycle.

For efficient functioning of the proposed system, it is essential to ensure fast and reliable operation through proper placement of the QR code on the package during production, and fast and easy data reading by the product consumer. This paper presents the results of a readability analysis of QR code of variable contents, size and data error correction level, which are read by smartphones running an Android platform. The experiments were performed with various types of base material on which the code was printed. Furthermore, QR code readability analysis was conducted in the case when there is a geometric deformation of the code. Based on the detailed analysis of the collected data, it can be concluded that QR code readability is not directly influenced by the number of coded characters, or by the error correction level, but only by the size of modules that constitute the code.

Furthermore, the results show that the change of the base material does not influence the read time, but influences the code readability. The paper further presents an example of the proposed traceability system, where the QR codes are used for data tracking and tracing for fruit yogurts, based on the recommendations gained through the readability analysis. This traceability system concept is universal and can be used for various products with slight modifications. Another research found that traceability systems can also bring other benefits to production systems and supply chains. In the literature these benefits are extensively discussed, but studies that quantify them are scarce. (Saltini and Akkerman, 2012; Shakiba, Jit Singh, and Abdullah, 2015).

In this paper we propose two hypothetical improvements of the traceability system within the chocolate production system and supply chain and we illustrate the resulting benefits by using a case study. Based on the case study, we quantify the influence of these improvements on production efficiency and recall size in case of a safety crisis by developing a simulation tool. These results are aimed to illustrate and quantify the additional benefits of traceability information, and could help food industries in deciding whether and how to improve their traceability systems.

Research Objective

1. To study the suitable information technology pattern for the traceability process of exported golden banana.

2. To design the suitable information technology pattern for the traceability process of exported golden banana.

Research Methodology

Research Design

This research was designed as a quantitative research.

Sample

The sample of this research was purposively selected from information technology users working in the companies of exported golden banana.

Research Instrument

A questionnaire and an IOC form were applied to collect data from the information technology users working in the companies of exported golden banana.

Data Collection

In the data gathering process, the researchers retrieve the data as followed.

1. Study and analyze the academic database and related research.
2. Study the current exporting situation of the golden banana.
3. Study the traceability pattern of the agriculture product.
4. Analyze and design the traceability system of golden banana.
5. Test the prototype of the traceability system of golden banana.
6. Edit and correct the traceability system of golden banana.
7. Test the suitability of the traceability system of golden banana.

Data Analysis

In the analyze process, the researchers analyzed the suitability of the traceability system of golden banana by using IOC (index of concordance)

An index of -1 can be interpreted as complete agreement by all experts that the item is measuring all the wrong objectives. An index of +1 can be interpreted as complete agreement by all experts that the item is measuring all the correct objectives.

After the IOC method was applied to the responses of the judges' agreement, the obtained scores were compared with the criteria. The statements which could be accepted to be the statements included in the pilot form of the scale should obtained IOC value between 0.50 – 1.00.

So, the IOC value of the question should be more than 0.50 in order to make the traceability system of golden banana suitable.

After the first phase, when the research team collected data from in-depth interviews, which are experts, the research team will analyze the data in accordance with the qualitative data analysis guideline.

Findings

In the analysis and design of information systems for traceability of golden banana, the process can be divided into 6 parts which are (1) Tracking Product (2) Import GMP-data (3) Import GAP-data (4) Import export-data (5) Label Print and (6) Sign out

Table 1 The result of IOC of Traceability System of Golden Banana's Supply Chain

Detail	Level of IOC			
	+1	0	-1	Result of IOC
1. Golden Banana's Supply Chain Model	3	0	0	1.00

From table 1, it was found that the result of IOC of traceability system of golden banana's supply chain model had a mean of IOC at 1.00 which means that the golden banana's supply chain model was good.

Table 2 The result of IOC of Information Technology System

Detail	Level of IOC			
	+1	0	-1	Result of IOC
1. User Recognition Technology	3	-	-	1.00
2. Database Design	3	-	-	1.00
3. Traceability System User Interface	2	1	-	0.67
4. User Interface Design	3	-	-	1.00
5. Accuracy of the System	3	-	-	1.00
6. Ease of the System	3	-	-	1.00

From table 2, there was found that the result of IOC on information technology system on user recognition technology, database design, user interface design, accuracy of the system and ease of the system equal to 1.00 which mean that the level is good. While the result of traceability system user interface was at 0.67 but still in a good level.

Table 3 The Result of IOC of User

Detail	Level of IOC			
	+1	0	-1	Result of IOC
1. User	3	-	-	1.00
2. Completeness of Export Data	3	-	-	1.00
3. Accuracy of Export Data	3	-	-	1.00
4. Ease and Quickness of Traceability Test	3	-	-	1.00

From table 3, the result of IOC of user in the user, completeness of export data, accuracy of export data and ease and quickness of traceability test were at 1.00 which mean that the level of IOC is good and appropriated.

Discussion and Suggestion

From the fundamental of supply chain which include inbound Logistics, outbound Logistics and reverse Logistics which the reverse logistics is the main concept for the traceability system in this research. After the result of this research came out, the most essential data for the label are export data, fruit data and GMP data. These data will show the origin of the product and will reduce the cost of operation in order that there is a recall of the defected goods.

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